

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 20 March 2001 (20.03.01)	
International application No. PCT/JP00/04571	Applicant's or agent's file reference 00-018-PCT
International filing date (day/month/year) 07 July 2000 (07.07.00)	Priority date (day/month/year) 13 July 1999 (13.07.99)
Applicant YONEDA, Yasuhiro et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

02 February 2001 (02.02.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

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made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Henrik Nyberg
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PCT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 00-018-PCT	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/JP 00/ 04571	International filing date (day/month/year) 07/07/2000	(Earliest) Priority Date (day/month/year) 13/07/1999
Applicant KAO CORPORATION		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.
☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :
- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the title,

- ☒ the text is approved as submitted by the applicant.
- ☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- ☒ the text is approved as submitted by the applicant.
- ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

- ☐ as suggested by the applicant.
- ☐ because the applicant failed to suggest a figure.
- ☐ because this figure better characterizes the invention.
- ☒ **None of the figures.**

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 00-018-PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/JP00/04571	International filing date (day/month/year) 07/07/2000	Priority date (day/month/year) 13/07/1999
International Patent Classification (IPC) or national classification and IPC C09K3/14		
Applicant KAO CORPORATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 8 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 02/02/2001	Date of completion of this report 16.07.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer olde Scheper, B Telephone No. +49 89 2399 2141 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/JP00/04571

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-62 as originally filed

Claims, No.:

1-10 with telefax of 11/06/2001

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/JP00/04571

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☐ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☒ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☒ not complied with for the following reasons:
see separate sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos. .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-10
	No: Claims
Inventive step (IS)	Yes: Claims 1-10
	No: Claims
Industrial applicability (IA)	Yes: Claims 1-10
	No: Claims

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/JP00/04571

2. Citations and explanations
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re Item IV

Lack of unity of invention

1. The subject-matter of claims 1, 5 and 6 relates to polishing compositions which compositions are characterized by three different groups of components:
 - i) a compound having a structure in which each of two or more adjacent carbon atoms has a hydroxyl group in a molecule (claim 1),
 - ii) an aliphatic carboxylic acid having 7 to 24 carbon atoms (claim 5),
 - iii) an amine compound represented by formula (II) (claim 6).

No structural relationship can be established between said three components.

Thus, the technical relationship between independent claims 1, 5 and 6 is the special technical feature "polishing liquid composition comprising water".

Prior art documents D1-D5 disclose said special technical feature (see Section V below).

The concept linking said independent claims 1, 5 and 6 is therefore known and as a consequence there is no single inventive concept and the application lacks unity (Rule 13 PCT).

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

- D1: PATENT ABSTRACTS OF JAPAN vol. 1999, no. 09, 30 July 1999 (1999-07-30) & JP 11 116942 A (FUJIMI INC), 27 April 1999 (1999-04-27) cited in the application & computer translation provided for by the Japanese Patent Office: <http://www1.ipdl.jpo-miti.go.jp/PA1/cgi-bin/PA1INIT?971964494130>
- D2: US-A-4 141 850 (READIO PHILIP D ET AL) 27 February 1979 (1979-02-27)
- D3: US-A-4 158 593 (ALLAN JOHN L H ET AL) 19 June 1979 (1979-06-19)

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/JP00/04571

D4: EP-A-0 811 665 (CABOT CORP) 10 December 1997 (1997-12-10) cited in the application

D5: US-A-5 496 485 (MATERNAGHAN DAVID S) 5 March 1996 (1996-03-05)

1. The present application relates to polishing liquid compositions (claims 1-8) a process for polishing a semiconductor substrate (claim 9) and a process for the manufacturing of a semiconductor substrate (claim 10).

The polishing compositions are characterized in that said compositions comprise i) a compound having a structure in which each of two or more adjacent carbon atoms has a hydroxyl group in a molecule (claims 1-4), or ii) an aliphatic carboxylic acid having 7 to 24 carbon atoms (claim 5), or iii) an amine compound represented by formula (II) (claim 6).

It should be noted that the claims on file are by no means restricted to the features cited in said claims due to the feature "comprising".

2. D1 discloses aqueous polishing compositions which comprise amine compounds according to formula (II) (see claims 4, 13). Although hydroxy peroxide and fluoric acid (cf. paragraph [0009]) may be considered as oxidizing agents D1 only discloses their presence in a washing solution which is applied after the polishing. D1 further discloses compounds having at least two hydroxyl groups on adjacent carbon atoms such as ethylene glycol, polyethylene glycol, glycerol, diglycerol (see claim 9). However, since "m" must be "1" said compounds are not represented by formula (I) of present claim 1. Silica, which is an abrasive, is disclosed in claim 12 of D1. A process for polishing and therefore manufacturing of a semiconductor substrate is exemplified by the examples; see paragraphs [0042-0055].

Thus, it must be concluded that the subject-matter of claims 1-10 is not anticipated under Art. 33(2) PCT in view of this disclosure.

3. D2 discloses compounds having at least two hydroxyl groups on adjacent carbon atoms such as ethylene glycol (cf. Examples 6-15; Table II) which are used in

aqueous polishing compositions comprising oxidizing agents. However, since "m" must be "1" said ethylene glycol is not represented by formula (I) of present claim 1.

Thus, it must be concluded that the subject-matter of claims 1-10 is not anticipated under Art. 33(2) PCT in view of this disclosure.

4. D3 discloses polishing compositions comprising secondary or tertiary alcohols containing at least two hydroxyl groups (claim 1). D3 is however silent with respect that at least two hydroxyl groups should be positioned on adjacent carbon atoms. The only specific example of a diol is 2,5-dimethyl-2,5-hexanediol.

Thus, it must be concluded that the subject-matter of claims 1-10 is not anticipated under Art. 33(2) PCT in view of this disclosure.

5. D4 discloses a polishing composition comprising water, aliphatic carboxylic acids such as capric acid, caprylic acid, lauric acid, myristic acid and palmitic acid (examples of aliphatic carboxylic acids having 7 to 24 carbon atoms) and an oxidizing agent (claims 1, 20), which may further include an abrasive (claims 1-26). Further a process for polishing and therefore manufacturing of a semiconductor substrate is also disclosed (claims 27-59).

It appears from the disclosure at page 4, lines 29-48 that the oxidizing agent oxidizes the surface only and that its action is different from an etching agent, which dissolves the metal from the surface. Although succinic acid, acetic acid, tartaric acid, phthalic and gluconic acid (cf. D4, examples) are examples of etching agents defined in the present application (cf. page 14) there is no disclosure in D4 that mixtures of said acids/etching agents with one of the aliphatic carboxylic acids having 7 to 24 carbon atoms can be used.

Thus, it must be concluded that the subject-matter of claims 1-10 is not anticipated under Art. 33(2) PCT in view of this disclosure.

6. D5 discloses aqueous polishing compositions in which amines such as 1,5-dimethyl hexyl amine, octylamine, dodecylamine, 2-ethyl hexyl amine, N,N-

dimethyldodecylamine are used (see Examples 1-5). Said compositions comprise etching agents (see claims 1-14). D5 is silent with respect to the use of oxidizing agents.

Thus, it must be concluded that the subject-matter of claims 1-10 is not anticipated under Art. 33(2) PCT in view of this disclosure.

7. The object of the present application is to provide for polishing compositions and a process for polishing a semiconductor substrate which is free of defects such as dishing in the metal layer during the formation of interconnection, with retaining an etching action for polishing the metal film on the insulating film.

The examples show that said object has been met.

Since in none of the available prior art documents the problem of dishing is addressed, does said prior art not contain any hint or indication which would have enabled the skilled person to solve the problem underlying the application with the different features of the invention.

Thus, the subject-matter of claims 1-10 meets the requirements of Art. 33(3) PCT.

8. The present application satisfies the criterion set forth in Article 33 (4) PCT because the subject matter of Claims 1-10 is industrially applicable.

Re Item VIII

Certain observations on the international application

1. The description has not been adapted to the limitations of the claims (Art. 6 PCT).

INTERNATIO

SEARCH REPORT

Inventor's Application No

PCT/JP 00/04571

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C09K3/14 C09K13/00 C09G1/00 H01L21/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C09K C09G H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

PAJ, WPI Data, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 09, 30 July 1999 (1999-07-30) & JP 11 116942 A (FUJIMI INC), 27 April 1999 (1999-04-27) cited in the application abstract ---	1-5,8-11
X	US 4 141 850 A (READIO PHILIP D ET AL) 27 February 1979 (1979-02-27) examples 6-15; table II ---	1-5,8-11
A	US 4 158 593 A (ALLAN JOHN L H ET AL) 19 June 1979 (1979-06-19) claim 1 ---	1-5,8-11
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

19 October 2000

Date of mailing of the international search report

26/10/2000

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INTERNATIONAL SEARCH REPORT

In Application No

PCT/JP 00/04571

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 811 665 A (CABOT CORP) 10 December 1997 (1997-12-10) cited in the application claims 1-59 ---	6,8-11
X	US 5 496 485 A (MATERNAGHAN DAVID S) 5 March 1996 (1996-03-05) claims 1-14; examples 1-5 -----	7-11

INTERNATIONAL SEARCH REPORT

Information on patent family members

In. Application No

PCT/JP 00/04571

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 11116942 A	27-04-1999	NONE	
US 4141850 A	27-02-1979	CA 1136026 A CH 642676 A DE 2848453 A FR 2407975 A GB 2007165 A,B IT 1100466 B JP 1095191 C JP 54068740 A JP 56039711 B MX 149715 A MY 1086 A NL 7811108 A	23-11-1982 30-04-1984 17-05-1979 01-06-1979 16-05-1979 28-09-1985 27-04-1982 02-06-1979 16-09-1981 14-12-1983 31-12-1986 10-05-1979
US 4158593 A	19-06-1979	NONE	
EP 0811665 A	10-12-1997	US 5858813 A AU 2804897 A JP 10044047 A WO 9743087 A	12-01-1999 05-12-1997 17-02-1998 20-11-1997
US 5496485 A	05-03-1996	AT 171979 T DE 69321465 D DE 69321465 T EP 0640120 A WO 9323493 A JP 7506616 T	15-10-1998 12-11-1998 24-06-1999 01-03-1995 25-11-1993 20-07-1995